

UNITED STATES DISTRICT COURT  
DISTRICT OF MINNESOTA

3M Company and 3M Innovative  
Properties Company,

Plaintiffs,

**MEMORANDUM OPINION  
AND ORDER**

Civil No. 10-2630

v.

Avery Dennison Corporation,

Defendant.

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John C. Adkisson, Ann N. Cathcart Chaplin and Geoff D. Biegler, Fish & Richardson P.C., Kevin H. Rhodes and William D. Miller, 3M Innovative Properties Company and M. Sean Royall, Gavin S. Martinson, Michael L. Raiff, Daniel S. Floyd, Samuel G. Liversidge and Daniel M. Flores, Gibson, Dunn & Crutcher, LLP, Counsel for Plaintiffs.

Kurt J. Niederluecke and Lora M. Friedemann, Fredrikson & Byron, P.A. and Charles K. Verhoeven, David Bilsker, Christopher E. Stretch, James E. Baker and Emily O'Brien, Quinn Emanuel Urquhart & Sullivan, LLP, Counsel for Defendant.

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This matter is before the Court for claim construction on a number of disputed claim terms.

**I. Background**

This action involves five patents, the rights, title and interest having all

been assigned to Plaintiffs 3M Company and 3M Innovative Properties Company (“3M”), which cover different aspects of retroreflective sheeting that is used on roadways. In the Amended Complaint, 3M alleges that Defendant Avery Dennison Corporation (“Avery”) makes, uses, and sells a product called the OmniCube T-11500 Prismatic Reflective Film that embodies the inventions claimed in the patents-in-suit. Retroreflective sheeting is sheeting which reflects light emitted from a vehicle’s headlights back towards the driver, making the sign or marker conspicuous and easy to read. (Declaration of Dr. Kenneth L. Smith ¶ 9.)

## **II. Patents in Suit**

The patents at issue in this case are U.S. Patent Nos. 5,936,770 (“the ‘770 patent”), 6,318,987 (“the ‘987 patent”), 7,152,983 (“the ‘983 patent”), and 7,261,426 (“the ‘426 patent”). 3M asserts the ‘770 patent, or Nestegard patent, discloses a cube corner retroreflective sheeting with alternating zones of cube corner elements disposed at approximately ninety degree angles to each other, which in turn creates two principal planes of improved reflection of light. 3M further asserts the ‘770 patent features embodiments of sheeting that have alternating arrays of cube corners that are canted in different directions.

The '987 patent, or Luttrell patent, discloses laminae, which are small plates used at the beginning of the manufacturing process to form molds that can be used to form sheeting with cube corners. This patent also discloses methods that reduce the number of laminae necessary to produce cube corner element molds.

The '983, '426 and '386 patents, collectively referred to as the Smith patents, stem from the same patent application. The Smith patents disclose full cube corner geometries for controlling the divergence profile of retroreflective sheeting; the divergence profile referring to the spread of retroreflected light relative to the source. The cube corners include three faces that join at three edges, forming a dihedral angle. In a perfect cube corner, the angles are at  $90^\circ$ . The Smith patents teach that introducing errors from  $90^\circ$  right angles to two specific edges of the cube corner element yields optimal divergence of the light reflecting from the cube corners. If the angles remain at  $90^\circ$ , the light reflects directly back to the light's source, which is not ideal for sign applications because the driver's eyes are not in exactly the same position as the headlights of the car.

### **III. Standard for Claim Construction**

Words in a claim are generally given their ordinary and customary

meaning as to one skilled in the art at the time of the invention. Phillips v. AWH Corp., 415 F.3d 1303, 1312 (Fed. Cir. 2005). “In some cases, the ordinary meaning of claim language as understood by a person of skill in the art may be readily apparent even to lay judges, and claim construction in such cases involves little more than the application of the widely accepted meaning of commonly understood words.” Id. at 1314. When the ordinary and customary meaning of claim language is not readily apparent, however, the Court must look to “those sources available to the public that show what a person of a skill in the art would have understood disputed claim language to mean.” Id. (citation omitted). Such sources include the words of the claims themselves, the specification, the prosecution history and extrinsic evidence concerning relevant scientific principles, the meaning of technical terms, and the state of the art. Id.

A claim is to be read in view of the specification, yet the Court cannot read a limitation into a claim based on the specification. Renishaw PLC v. Marposs Societa' Per Azioni, 158 F.3d 1243, 1249 (Fed. Cir. 1998) (citing Vitronics Corp. v. Conceptronic, Inc., 90 F.3d 1576, 1582 (Fed. Cir.1996); Markman v. Westview Instruments, Inc., 52 F.3d 967, 979-80 (Fed. Cir. 1995) (en banc), aff'd, 517 U.S. 370 (1996)). The same is true with regard to the prosecution history, which can be

used to understand the claim, but not to enlarge, diminish or vary the limitations in the claim. Markman, 52 F.3d at 980. Similarly, extrinsic evidence, such as inventor or expert testimony, dictionaries and treatises, cannot be used to vary or contradict the terms of the claims. Id. at 981. Finally, a patentee is free to be his/her own lexicographer, but any special definition given to a word must be clearly defined in the specification. Id.

**A. The '770 Patent**

3M is asserting claims 45, 46 and 48 of the '770 patent.

Claim 45 reads as follows:

A retroreflective sheeting comprising a substrate having a base surface and a structured surface opposite the base surface, the structured surface comprising:

a first array of cube corner elements;

a second array of cube corner elements, optically opposing the cube corner elements of the first array, the optical axes of the cube corner elements in the first and second arrays, canted to define a first primary plane of improved retroreflective performance at increased entrance angles, the first primary plane extending substantially parallel with longitudinal edge of the sheeting;

a third array of cube corner elements; and

a fourth array of cube corner elements optically opposing the cube corner elements of the third array, the optical axes of the cube corner

elements in the third and fourth arrays canted to define a second primary plane of improved retroreflective performance at increased entrance angles, the second primary plane being perpendicular to the first primary plane.

(Adkisson Decl., Ex. A (the '770 patent).)

Claim 48 depends on claim 45 and reads:

wherein: the retroreflective sheeting comprises substantially similar retroreflective performance in response to light incident on the sheeting across a range of entrance angles in the first primary plane and the second primary plane.

(Id.)

The parties seek construction of the following claim terms.

**1. “Perpendicular”**

3M asserts that this term does not need to be construed. Avery asserts the term must be construed as “intersects at 90°.” The Court finds that this term need not be construed, as it is a common term that is being used consistent with its ordinary meaning. Avery’s proposed construction provides for a rigid definition that is not supported by the intrinsic evidence. See Stryker Trauma S.A. v. Synthes, No. Civ. A. 01CV3879, 2005 WL 2245385, at \*4 n.3 (D. N.J. Sept. 8, 2005) (court did not adopt a rigid definition of “perpendicular” as it would have required a bar insertion angle at a perfect 90%).

**2. “Primary Plane of Improved Retroreflective Performance at Increased Entrance Angle”**

3M proposes that this phrase be construed as “the first/second primary plane of improved retroreflective performance at increased entrance angles results from the canting.” In addition, 3M proposes the following construction of the word “primary” - “first in importance, chief, principal, main.” Avery proposes the following construction “the plane(s) (direction) with the highest performance at particular angles.”

The crux of the dispute between the parties as to this claim term is how to define “primary.” 3M relies on a dictionary definition, and Avery asserts that such dictionary definition is vague, and does not address itself to the subject matter of the claim. Avery argues its proposed construction defines primary, with respect to plane, as that which shows the highest retroreflective performance at a particular increased entrance angle. 3M believes Avery’s construction is unclear as it could cover planes other than the first/second primary plane.

Taking into consideration the claim language and the specification, as well as the parties’ arguments, the Court will adopt the following construction: “the

first/second primary plane of improved retroreflective performance at increased entrance angles results from the canting, wherein 'primary' refers to the plane with the highest retroreflective performance at a particular angle."

### **3. "Extending Substantially Parallel with a Longitudinal Edge"**

3M proposes the following construction: "extending substantially parallel with an edge of a length of sheeting." Avery proposes the following construction: "cube corners of the claimed array with their primary groove aligned without interruption parallel to off parallel by 1° along the entire longitudinal edge." 3M asserts that Avery's construction is too narrow and is contradicted by the other words of claim 45 and it seeks to introduce limitations that are inconsistent with the plain meaning of the claim language and with the intrinsic record.

It is Avery's position that during the prosecution of the parent application to the '770 patent, 3M distinguished its invention by amending the claims to require a zone "extending substantially parallel with a longitudinal edge of said sheeting" in order to avoid a finding of anticipation in light of the Van Arnam patent. (O'Brien Decl., Ex. 23 at AVERY 0000916.) Avery asserts that 3M took the position that the claim covered parallel strips which ran the entire length of the



sheeting, and in doing so, 3M rejected “tiles” of cube corners, and argued its patent covered “strips” of cube corners.

The Court has reviewed the prosecution history, and finds no evidence that 3M sought to disclaim all tiled sheeting during the prosecution of the parent patent. Rather, the prosecution history demonstrates that the patent examiner rejected the original claim 1 as anticipated by Arnam, but noted that the prior art did not teach or fairly suggest the structure defined in the original claim 3, which was written as dependent on claim 1. (Biegler Decl., Ex. H.) The patent examiner further noted that claim 3 would be allowed if rewritten in independent form. (Id.) 3M responded to the examiner’s actions, by rewriting claim 3 as an independent claim.

The Court further finds that the term at issue relates to the “primary plane”, which the parties do not dispute is an optical feature rather than a structural feature. Avery’s proposed construction, however, addresses structural features, and inserts limitations that are not supported by either the claim language or the specification. The Court will thus adopt 3M’s proposed construction of this term.

## **B. The ‘987 Patent**

This patent is entitled “Cube Corner Sheeting Mold and Method of Making the Same.” (Adkisson Decl., Ex. B (the ‘987 patent).) This invention is described as “providing a master mold suitable for use in forming retroreflective sheeting from a plurality of laminae and methods of making the same.” (Id. col. 3:46-48.) In addition, the invention provides “[e]fficient, cost-effective methods of making molds formed from a plurality of laminae.” (Id. col. 3: 60-61.) In this action, 3M is asserting claims 12 and 18-20 of the ‘987 patent.

Claim 12 reads as follows:

A lamina suitable for use in a mold for use in forming retroreflective cube corner articles, the lamina having opposing first and second major surfaces defining therebetween a first reference plane, the lamina further including a working surface connecting the first and second major surfaces, the working surface defining a second reference plane substantially parallel to the working surface and perpendicular to the first reference plane and a third reference plane perpendicular to the first reference plane and the second reference plane, the lamina comprising:

- a first groove set including at least two parallel adjacent V-Shaped grooves in the working surface of the lamina defining a first groove surface and a second groove surface that intersect substantially orthogonally to form a first reference edge;
- a second groove set including at least two parallel adjacent V-shaped grooves in the working surface of the lamina defining a third groove surface and a fourth groove surface that intersect substantially orthogonally to form a second reference edge; and
- a third groove set including at least one groove in the working surface of the lamina defining a fifth groove surface and a sixth groove surface, the fifth groove surface intersecting substantially orthogonally

with the first and second groove surface to form at least one first cube corner element disposed in a first orientation and the sixth groove surface intersecting substantially orthogonally with the third and fourth groove surfaces to form at least one second cube corner element disposed in a second orientation different than the first orientation;

wherein the at least one first cube corner element comprises a plurality of nonidentical cube corner elements.

Claim 18 recites:

The lamina of claim 12 where at least one of the groove sets comprises grooves of differing depths in the working surface of the lamina.

Claim 19 recites:

A mold comprising the lamina of claim 18.

**1. “Lamina” and “Laminae”**

3M proposes that “lamina” be construed as “a thin plate” and that “laminae” be construed as “more than one lamina.” Avery proposes that “lamina” be construed as “a single plate as depicted in Figure 1 into which rows of cube corner elements are cut onto the edge”<sup>1</sup> and that “laminae” should be construed as “collection of single thin plates as depicted in Figure 1 into which rows of cube corner elements are cut onto the edge.”

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<sup>1</sup>This construction was included in the First Revised Claim Construction report filed by Avery on December 12, 2011, which is different than the construction included in Avery’s Markman Hearing Presentation that was submitted to the Court on December 13, 2011. [Doc. No. 200]

Avery asserts its construction is necessary to distinguish between the lamina and the tool used to form the cube corners on the sheeting. The lamina is a part of the method used for manufacturing a mold, and the mold is duplicated by one of several techniques to produce tooling for forming cube corner sheeting. Because lamina are used to make the mold, which is then used to make the tooling, multiple lamina cannot be the same as the tool.

3M asserts that its construction of lamina/laminae does not broaden the asserted claims to encompass the tool or belt used to form cube corners on retroreflective sheeting. The asserted claims required the lamina to be suited for use in a mold, and that a series of grooves be formed on the working surface of the lamina. These requirements prevent the asserted claims from encompassing a tool.

The Court finds that Avery's construction improperly imports additional limitations into the terms lamina/laminae without any support. Claim 12 expressly recites what Avery is seeking to import through its definition of lamina, when it speaks to a "working surface." Claim 12 further requires "groove sets . . . in the working surface" that define groove surfaces that intersect to form "at least one cube corner element" in the lamina. Thus, the plain

language of claim 12 already expresses that cube corner elements are formed in the working surface of the lamina, making Avery's construction superfluous. Accordingly, the Court will adopt 3M's proposed construction of lamina and laminae.

## 2. "Substantially Orthogonally"

3M proposes "substantially orthogonally" be construed as "approximately 90 degrees" while Avery proposes "perpendicular to 1° off perpendicular."

3M asserts that as used in the asserted claims, this term refers to the intersection of groove surfaces that form cube corner elements. The specification provides:

As used herein, the terms "substantially orthogonally" or "approximately orthogonally" shall mean that the dihedral angle between the respective surfaces measures approximately 90°; slight variations in orthogonality as disclosed and claimed in U.S. Pat. No. 4,775,210 to Appeldorn are contemplated.

(Adkisson Decl., Ex. B col. 9:25-30.) 3M argues that because the inventor acted as his own lexicographer, such definition controls. 3M Innovative Prop. Co. v. Avery Dennison Corp., 350 F.3d 1365, 1374 (Fed. Cir. 2003).

Avery points out that the definition of "substantially orthogonally" also includes "slight variations in orthogonality as disclosed and claimed in U.S. Pat.

No. 4,775,219 to Appeldorn are contemplated.” The ‘219 patent states that variations are generally between 15 and 30 arc minutes or less, though they can be somewhat more. (O’Brien Decl., Ex. 18 col. 8:23-27.) Avery thus asserts that through its incorporation of the ‘219 patent, the ‘987 specification demonstrates that words like “substantially” and “approximately” can be quantified. Avery’s construction - as up to one degree - is consistent with the intrinsic evidence.

Avery further asserts the testimony of the inventor, Kevin Smith, supports its construction. When asked questions about the definition of substantially, Smith testified “generally speaking I would say the patent talks about the issue. I think it’s about a degree.” (Doc. No. 192-1 at 165-66.)

The Court finds that the intrinsic evidence does not support Avery’s position that “substantially” be quantified as  $1^{\circ}$  off perpendicular. As noted above, the ‘219 patent speaks of variations that are *generally* between 15 and 30 arc minutes or less, and the inventor testified in generalities. Accordingly, the Court will adopt 3M proposed construction.

### **3. “Substantially Parallel”**

3M asserts that the term need not be construed, and that substantially be given its ordinary meaning - a term of approximation. Avery responds that this

term should be construed as “parallel to  $1^\circ$  off parallel” which is consistent with the intrinsic and extrinsic evidence as discussed above. For the reasons discussed with respect to “substantially orthogonally” the Court will construe this term as “approximately parallel.”

#### **4. “Parallel” and “Perpendicular”**

3M asserts these words should be given their ordinary meaning. Avery asserts that parallel be construed as “two lines in a plane that do not intersect or meet” and perpendicular be construed as “intersects at  $90^\circ$ .” Avery asserts these constructions are necessary to distinguish “parallel” from “substantially parallel” and “perpendicular” from “substantially perpendicular.”

The Court finds that these terms need not be construed, as they are common terms that are being used consistent with their ordinary meaning. Avery’s proposed construction provides for a rigid definition that is not supported by the intrinsic evidence. See Stryker, 2005 WL 2245385, at \*4 n.3 (court did not adopt a rigid definition of “perpendicular” as it would have required a bar insertion angle at a perfect  $90^\circ$ ).

#### **5. “Nonidentical Cube Corner Elements”**

3M provides the following proposed construction: “cube corner elements

that intentionally do not have the same size, shape, geometry and/or orientation.”

Avery’s proposed construction is: “cube corner elements that are not substantially identical in size, geometry or orientation to other cube corner elements on a row in a lamina.”

With respect to this claim term, the dispute centers on whether such term should be construed to require that the variations in the cube corners be intentional. 3M asserts that “intentional” should be included in the construction, as the specification provides that the user of the patent can choose to have identical or nonidentical cube corner elements. “The plurality of laminae can include substantially identical cube corner elements or may include cube corner elements of varying size, geometries, or orientations.” (’987 patent, col. 18:16-18.)

First, the Court notes that nowhere in the specification is there specific language that requires the variations in the cube corners be intentional. The portion of the specification cited to by 3M does not include the word “intentional.” Rather, the specification merely provides that a plurality of laminae *may* include elements of varying size, geometries, or orientations.

Generally, intent is not relevant to whether an accused product infringes a patent. Intel Corp. v. U.S. Int’l Trade Comm’n, 946 F.2d 821, 832 (Fed. Cir. 1991).



The Federal Circuit has held that importing a subjective intent into a claim may render the claim invalid for indefiniteness. See Datamize, LLC v. Plumtree Software, Inc., 417 F.3d 1342, 1350 (Fed. Cir. 2005) (finding that the scope of claim language cannot depend solely on the unrestrained, subjective opinion of a particular individual practicing the invention). See also, Rackable Sys., Inc. v. Super Micro Computer, Inc., No. C -5-3561, 2006 WL 3065577, at \*8 (N.D. Cal. Oct. 27, 2006) (finding a claim term indefinite because such term depended on a user's purpose); Halliburton Energy Servs., Inc. v. M-I, LLC, 456 F. Supp. 2d 811, 816-18 (E.D. Tex. 2006) (finding terms, such as "more liquid-like" and "less gel-like" indefinite as they do not provide an objective standard for determining their scope).

3M argues that the Federal Circuit has also recognized that patentees may properly incorporate an intent requirement into patent claims. Koito Mfg. Co. v. Turn-Key-Tech, LLC, 381 F.3d 1142, 1150 n.2 (Fed. Cir. 2004) (finding that construction of a claim term may require an actor to have knowledge of certain facts); Combined Sys., Inc. v. Defense Tech. Corp. of Am., 350 F.3d 1207, 1214 (Fed. Cir. 2003) (finding that district court's construction of claim that required "forming folds" as a distinct step in a claimed method). Both Koito and Defense

Tech. are distinguishable from this case, however.

Koito involved construction of the term “predetermined general direction” with respect to a mold design, where the district court found “predetermined” required intent or foreknowledge. Id. 381 F.3d at 1150. Here, neither the claim language or the specification includes the word “intentional.” Also, like Koito, Defense Tech. involved a method claim, whereas this case involves an apparatus claim. Although the Federal Circuit has not specifically differentiated its decision in Koito from cases involving apparatus claims, other courts have done so. See, e.g., ADC Telecommunications, Inc. v. Switchcraft, Inc., Civ. No. 04-1590, 2005 WL 2206115, at \*9 (D. Minn. Sep. 9, 2005) (“The terminology at issue in Koito is distinguishable from ‘waveguide’ at issue in the instant case. First, Koito dealt with a method claim rather than the apparatus claim as in the case at bar. Second, and more importantly, the term ‘predetermined’ inherently requires foreknowledge in a manner completely absent from ‘waveguide.’”).

The Court finds that neither the claim language or the specification in this case requires that the variations that make cube corner elements nonidentical be intentional. Accordingly, the Court will adopt Avery’s construction of this claim term.

**C. The Smith Patents - '983, '426 and '386 Patents**

The Smith patents all stem from the same patent application, and all are entitled "Lamina Comprising Cube Corner Elements and Retroreflective Sheeting."

**1. The '983 Patent**

In this action, 3M is asserting claims 19, 20, 22 and 26 of the '983 patent.

Claim 19 reads:

A lamina comprising a row of cube corner elements on an edge of the lamina, the cube corner elements having face formed from a side groove set wherein the grooves are nominally parallel to each other and range from being greater than nominally parallel to non-parallel to within  $1^\circ$  to reference plane (28).

Claim 20 recites:

The lamina of claim 19 wherein the cube corner elements are preferred geometry cube corner elements.

Claim 22 recites:

Retroreflective sheeting comprising a row of preferred geometry cube corner elements having faces defined by a side groove set wherein at least two grooves within the set are nonparallel by amounts ranging from greater than nominally parallel to about  $1^\circ$ .

Claim 26 reads:

Retroreflective sheeting comprising a row of preferred geometry cube

corner elements having face defined by a side groove set wherein the grooves are nominally parallel to each other and range from being greater than nominally parallel to non-parallel to within  $1^\circ$  to reference plane (28).

## **2. The '426 Patent**

With respect to the '426 patent, 3M is asserting claims 1 and 10. Claim 1 recites:

An article comprising preferred geometry cube corner elements wherein at least one cube comprises a 1-2 dihedral angle error and a 1-3 dihedral angle error; wherein the dihedral angle errors vary in opposition.

Claim 10 depends on claim 7, which in turn depends on claim 5. Claim 5 reads as follows:

An article comprising at least one preferred geometry cube corner elements having three dihedral angle errors wherein the dihedral angle errors are different from each other.

Claim 7 reads:

The article of claim 5 comprising a plurality of the elements in a row wherein at least one dihedral edge of the elements range from being nominally parallel to nonparallel by less than  $1^\circ$ .

Claim 10:

The article of claim 7 wherein the elements each have a first face and the first faces define a primary groove face.

## **3. The '386 Patent**

As to the '386 patent, 3M is asserting claims 1-4 and 9-11. Of these claims, the parties dispute terms found in claims 1, 3, 9 and 11. Claim 1 recites:

Retroreflective sheeting comprising an array of preferred geometry cube corner elements wherein at least one cube comprises a 1-2 dihedral angle error and a 1-3 dihedral angle error varied in opposition and the sheeting exhibits an average brightness at 0° and 90° orientation according to ASTM D4596-1a of at least 375 candelas/lux/m<sup>2</sup> for an entrance angle of -4° and an observation angle of 0.5°.

Claim 3 reads:

The sheeting of claim 1 wherein the elements are in a row having dihedral edges that range from being nominally parallel to nonparallel by less than 1°.

Claim 9 reads:

Retroreflective sheeting comprising a row of preferred geometry cube corner elements wherein a plurality of elements in the row have three dihedral angle errors that are different from each other and the sheeting exhibits an average brightness at 0° and 90° orientation according to ASTM D4596-1a of at least 375 candelas/lux/m<sup>2</sup> for an entrance angle of -4° and an observation angle of 0.5°.

Claim 11 recites:

The sheeting of claim 9 comprising a plurality of the elements in a row wherein at least one dihedral edge of the elements range from being nominally parallel to nonparallel by less than 1°.

The parties request construction of the following terms.

**a. "Preferred Geometry Cube Corner Element"**

3M proposes that this term be construed as “a cube corner that has at least one non-dihedral edge that: (1) is nonparallel to the reference plane; and (2) is substantially parallel to an adjacent non-dihedral edge of a neighboring cube corner, where the reference plane is a plane or other surface that approximates a plane in the vicinity of a group of adjacent cube corner elements or other geometric structures, the cube corner elements or geometric structures being disposed along the plane.”

Avery offers this construction: “cube corner retroreflecting elements that have at least one non-dihedral edge that 1) is nonparallel to a plane along which the cube corner elements are disposed and 2) is up to 1° off parallel to an adjacent (next to without an intervening edge of the same type) non-dihedral edge on a neighboring (next to or adjoining) cube corner.”

The specification defines this term as follows: “a PG [preferred geometry] cube corner element means a cube corner element that has at least one non-dihedral edge that : (1) is nonparallel to the reference plane; and (2) is substantially parallel to an adjacent non-dihedral edge of a neighboring cube corner element . . . ‘Reference Plane’ with respect to the definition of a PG cube corner element refers to a plane or other surface that approximates a plane in the

vicinity of a group of adjacent cube corner elements or other geometric structures, the cube corner elements or geometric structures being disposed along the plane.” (‘983 patent, col. 7:23-27, 29-35.) Because the inventors have acted as their own lexicographer by including a clear definition of this term in the specification, such definition should control. Avery, however, seeks to further define terms within that definition: “substantially parallel”, “adjacent” and “neighboring.”

For those reasons discussed with respect to the ‘987 patent, Avery argues that “substantially parallel” should be construed as “up to 1° off parallel.” The Court rejected this argument as to the ‘987 patent, and will reject it with respect to the ‘983 patent. Accordingly, the Court will construe “substantially parallel” as “approximately parallel.”

Avery further asserts that “adjacent” and “neighboring” should be construed, and that its proposed construction is consistent with the dictionary definitions of these words.

The Court finds that “adjacent” and “neighboring” should be given their ordinary meaning, and that such ordinary meaning is not limited by “next to without an intervening edge of the same type.” The dictionary definition of

“adjacent” is as follows: “a: not distant: nearby b: having a common endpoint or border c: immediately preceding or following.” Merriam-Webster’s Collegiate Dictionary 14 (10th Ed. 1999). “Neighboring” is defined as “to adjoin immediately or lie relatively near to.” Id. at 777. Both definitions provide that objects near to each other can properly be described as adjacent or neighboring - the definitions do not require that objects lie next to each other without an intervening edge. Further, there is nothing in the specification that requires such a construction. Accordingly, the Court will adopt 3M’s proposed construction.

**b. “1-2 Dihedral Angle Error” and “1-3 Dihedral Angle Error.”**

3M proposes that 1-2 dihedral angle error be construed as “a dihedral angle error of a dihedral angle formed between a side groove face and the primary groove face of the cube corner element.” Avery proposes the following construction “the dihedral angle error formed by the two out of three cube faces in a retroreflector that are designated as face ‘1’ and ‘2’.”

As to the 1-3 dihedral angle error, 3M proposes “the dihedral angle error of a dihedral angle formed between the other side groove face and the primary groove face of the cube corner element.” Avery proposes “the dihedral angle error formed by the two out of three cube faces in a retroreflector that are



designated as face '1' and '3'."

The dispute involves whether the faces of a cube corner can be arbitrarily assigned the designations "1" "2" or "3". 3M argues such assignment is not allowed, while Avery argues the specification suggests that arbitrary assignment is contemplated.

It is 3M's position that the significance of the "1-2" and "1-3" elements in terms of defining specific dihedral angle is apparent by looking to other claims, which refer generally to "dihedral angle errors." Further, 3M asserts its construction is supported by the specification, which notes that "[c]ube corners in general have three dihedral angles attributed to the intersections of the three cube faces. The deviation of these angles from 90° is commonly termed the dihedral angle error and may be designated by dihedral 1-2, dihedral 1-3, and dihedral 2-3." ('426 patent, col. 17:37-41.) The specification goes on to describe "one naming convention" that is depicted in Figure 22. The "cube dihedral angle error 1-3 is formed by the intersection of groove surface 82 with the primary groove face, and cube dihedral angle error 1-2 is formed by the intersection of groove surface 84 with primary groove face 50." (Id., col. 17:49-52.) Further, "cube dihedral 2-3 is formed by the intersection of groove surface 84 with groove surface 82." (Id., col.

17:53-54.) 3M asserts that in each of the working examples discussed in the specification, reference is made to Figure 22. By contrast, 3M argues that nothing in the specification supports Avery's position that "1-2" or "1-3" can refer to any cube face.

Finally, 3M asserts that the designation of the dihedral angle errors is critical to the invention. As evidenced in the specification, the 1-2 and 1-3 dihedral angle errors are affected by the introduction of skew or inclination into a preferred geometry cube corner and thus such dihedral angle errors are critical to controlling the light divergence created by the retroreflective sheeting. (Id. col. 17: 16-20; 18:20-23.)

It is Avery's position that the specification refers to more than one naming convention. One such naming convention is that discussed by 3M, as depicted in Figure 22. Avery asserts the specification later refers to another naming convention, without reference to Figure 22. "In one possible naming convention, positive inclinations results in decreasing both dihedral 1-3 and dihedral 1-2 for a given side groove while negative inclination results in increasing both dihedral 1-3 and dihedral 1-2" (Id. col. 18:20-22). Because the specification contemplates more than one naming convention, neither the claim language or the specification

requires the construction proposed by 3M.

The Court cannot accept Avery's construction. If the faces of a cube corner were meant to be arbitrarily assigned the designations "1" "2" or "3", there would be no need to refer to dihedral angle errors generally in some claims, yet designate the angle errors in other claims. See Phillips, 415 F.3d at 1314 (recognizing that other claims in patent can be a valuable source as to the meaning of a claim term). For example, in the '426 patent, claim 1 recites "[a]n article comprising preferred geometry cube corner elements wherein at least one cube comprises a 1-2 dihedral angle error and a 1-3 dihedral angle error, wherein the dihedral angel errors vary in opposition." Claim 5, however, recites "[a]n article comprising at least one preferred geometry cube corner element having three dihedral angle errors where the dihedral angle errors are different from each other." If the 1-2 and 1-3 dihedral angle errors are not specifically designated, as proposed by 3M, claims 1 and 5 of the '426 patent cover the exact same subject matter.

In addition, while the claim itself does not specifically assign the cube corner faces, the Court may look to the specification. As 3M points out, the eight working examples described in the specification provides the dihedral angles are

identified as defined in Figure 22. ('426 patent, col. 29:49-51.) The Court will thus adopt 3M's construction of this term.

**c. "Varied/Vary in Opposition"**

3M proposes this term be construed as "to intentionally provide within a given cube corner element a '1-2 dihedral angle error' and a '1-3 dihedral angle error' that are different in magnitude and/or sign." Avery proposes the following construction: "different in magnitude and/or sign." Avery argues that including "intentional" in the construction violates a fundamental tenant of claim construction, as it renders the term indefinite.

The specification includes a definition of this term as follows: "'Varied in opposition' as used herein is defined as intentionally providing within a given cube corner on a lamina dihedral 1-2 and 1-3 errors (differences from 90°) that differ in magnitude and/or sign." ('983 patent, col. 18: 37-40; '426 patent, col. 18:30-33; '386 patent, col. 18:11-14.) As discussed above, generally the Court should not impose an element of intent into a claim, unless specifically set forth in the claim or specification. See Intel Corp., 946 F.2d at 832 (finding that intent is not relevant to whether an accused product infringes a patent). Here, the inventors acted as their own lexicographer, and included a clear definition of

“varied in opposition” in the specification, which included “intentionally”.

Accordingly, the Court will adopt 3M’s construction as consistent with the definition as provided in the specification.

**d. “Row” and “Row of Cube Corner Elements”**

3M asserts these terms need no construction. Avery proposes that “row” be construed as “uninterrupted and having a common edge aligned on the same plane” and that “row of cube corner elements” similarly be construed as “uninterrupted cube corner elements having a common edge aligned on the same plane.”

3M asserts that while there are embodiments that feature an uninterrupted row, neither the claim or the specification requires that the row be uninterrupted. In fact, the specification provides only that “[r]egardless of whether the third face is a working surface . . . of the lamina or a primary groove face, the third face of each element within a row *preferably* share a common plane.” (’983 patent, col. 9:57-60) (emphasis added).

Avery responds that the specification supports its construction, citing that portion of the specification that recites “[w]ith respect to the sheeting, the row is defined by the elements wherein a face of each element within the row shares a

common plane.” (*Id.*, col. 27:65-28:1.) Avery further asserts that its construction is consistent with the testimony of 3M’s expert, Duncan Moore, who testified that a row of preferred geometry cube corners is “two or more preferred corner cubes such that they’re aligned with their common face, the groove face.” (O’Brien Decl., Ex. 7 at 68.) Moore further testified that if the preferred geometry cube corners share a primary groove, they would all be in the same row. (*Id.* at 72.)

The Court finds that Avery’s proposed construction imposes limitations that are not supported by either the intrinsic or extrinsic evidence. As the parties have pointed out, the specification discusses embodiments where the elements of a cube corner do share a common plane, and where the elements *preferably* share a common plane - from which one can infer that elements are not required to have a common plane. As to the limitation that the row be “uninterrupted” the Court finds no support for this limitation in either the intrinsic or extrinsic evidence. In the context of the asserted claim language, the Court finds that these terms can be given the plain and ordinary meaning.

**e. “Reference Plane (28)”**

3M proposes the following construction of this term as used in claim 19 of the ‘983 patent: “‘Reference plane (28)’ corresponds to the y-z plane in a Cartesian

coordinate system where the x-z plane corresponds to and is centered between the major surfaces of the lamina and the x-y plane extends substantially coplanar with the working surface of the lamina on which the cube corner elements are formed.”

3M proposes the following construction of the term as used in claim 26:

“‘Reference plane (28)’ corresponds to the y-z plane in a Cartesian coordinate system where the x-z plane corresponds to the primary groove and the x-y plane extends substantially coplanar with the sheeting along which the cube corner elements are located.”

Avery proposes the following: “the plane identified in Figure 1.”

Asserted claim 19 of the ‘983 patent is directed to “lamina.” The specification provides that the lamina can be characterized in three-dimensional space through use of a Cartesian coordinate system, referencing Figure 1. (‘983 patent, col. 8:13-23.) As to reference plane (28), the specification provides that “a third reference plane **28** referred to as the y-z plane, is centered between first end surface **20** and second end surface **22** and has the x-axis as its normal vector.” (Id. col. 8:20-23.) The specification further provides that “[f]or the sake of clarity, various geometric attributes of the present invention will be described with reference to the Cartesian reference planes as set forth herein. However, it will be

appreciated that such geometric attributes can be described using other coordinate systems or with reference to the structure of the lamina.”

(Id. col. 8:26031.)

3M asserts that its proposed construction of “reference plane (28)” as it relates to claim 19 is basically the textual description of the alignment of the planes that is shown in Figure 1. Therefore, it appears the parties agree as to what “reference plane (28)” relates to in claim 19, which relates to a lamina.

Asserted claim 26 of the ‘983 patent, however, refers to “retroreflective sheeting” as opposed to lamina. While the specification clearly describes reference plane (28) by superimposing a Cartesian coordinate system onto the structure of a lamina, there is no similar description of this term by superimposing a Cartesian coordinate system onto sheeting. While sheeting may be made from a master tool created by laminae, it is not required. (‘983 patent, col. 27:54-59.) As a result, 3M asserts that Avery’s construction, which simply refers to a lamina in Figure 1, does not translate to sheeting, as the reference plane must be described with reference to attributes of sheeting. For example, 3M asserts that as to lamina, reference plane (28) is describes in relation to the major working surface of the lamina. There is no major working surfaces on sheeting, however, therefore a



construction of reference plane (28) as to sheeting, with reference to a major working surface of lamina, is nonsensical. 3M asserts that its construction of reference plane (28) with respect to sheeting, describes the term by superimposing a Cartesian coordinate system onto sheeting, and positioning the x-z plane to correspond to the primary groove, and the x-y plane to extend substantially coplanar with the sheeting along which the cube corner elements are located.

Avery asserts that the Court cannot adopt 3M's proposed construction, which provides different meanings to the same claim term. FinControl Sys. Pty. Ltd. v. OAM, Inc., 265 F.3d 1311, 1318 (Fed. Cir. 2001). The law does recognize that terms can be given different meanings, however, if it is clear from the specification and prosecution history that different meanings apply. PODS, Inc. v. Porta Stor, Inc., 484 F.3d 1359, 1366 (Fed. Cir. 2007).

The Court finds that with respect to the asserted claims and patents at issue, it is appropriate to provide different constructions to the claim term "reference plane (28)." Claim 19 of the '983 patent describes a lamina with certain dimensions. Claim 26 of the same patent describes sheeting with certain dimensions. Figure 1 provides a helpful visual to understand the reference planes as to a lamina. However, because Figure 1 depicts reference planes (24) and (28)

based on the dimensions of a single lamina, Figure 1 would not translate to sheeting, which is typically made from a tool using multiple lamina.

Avery nonetheless argues 3M's construction adds limitations that are not required by the specification or the claims themselves. 3M's construction as to claim 26 defines reference plane (28) with respect to reference plane (24), and provides that reference plane (24) corresponds to the primary groove. Avery argues that nowhere in the specification is there language which suggests that the x-z plane, or reference plane (24), correspond with or line up to the primary groove. Figure 1, which defines the reference planes, includes no grooves.

The Court acknowledges that the specification does not provide a separate description of the reference planes with respect to sheeting. Nonetheless, the Court finds that 3M's construction of reference plane (28) with respect to sheeting is supported by the intrinsic evidence. As depicted in Figure 1, reference plane (24) is that plane that is centered between the major working surfaces of the lamina. As depicted in Figures 6 and 9, the primary groove corresponds to reference plane (24). Further, the specification describes "primary groove" as follows: "

A single lamina may have a single primary groove face, a pair of groove

faces on opposing sides and/or a primary groove along the intersection of working surface 16 with reference plane 24 that concurrently provides a pair of primary groove faces (e.g., FIG. 4). The primary groove is preferably parallel to reference plane 26 to within  $1^\circ$ .

(Id. col. 9:67 - 10:6.)

Further, the pairs of laminae having opposing orientation are positioned such that their respective primary groove faces 50 form primary groove 52.

(Id. col. 10:18-20.) Because the intrinsic evidence supports the alignment of the x-z plane/reference plane (24) with the primary groove, the Court finds it is appropriate to construe reference plane (28) with respect to sheeting by reference to the primary groove. The Court will thus adopt 3M's proposed constructions of reference plane (28).

**f. "Nominally Parallel"**

3M proposes the following construction: "parallel within the degree of manufacturing precision of the relevant manufacturing process." Avery's proposed construction reads: "no purposeful variation from parallel using a groove-forming machine with a degree of precision of at least  $1/4$  arc minute."

The specification provides: "Nominally parallel grooves are grooves wherein no purposeful variation has been introduced within the degree of precision of the groove-forming machine." ('983 patent, col. 9:2-4.) 3M asserts its

definition of nominally parallel follows from this definition and generalizes such definition for all structures.

Avery asserts its definition is faithful to the definition of “nominally parallel grooves” but also provides guidance as to the meaning of “degree of manufacturing precision.” To that end, the specification provides: “[t]he difference in magnitude is typically at least 1/4 arc minutes, more preferably at least 1/2 arc minutes, and most preferably at least 1 arc minutes. Hence the grooves are nonparallel by amount greater than nominally parallel.” (Id., col. 18:40-44.) Avery asserts this language means that the side grooves differing in angle by at least 1/4 arc minute are not nominally parallel. Avery asserts this level of precision was common in the art and was recognized in much earlier 3M patents. (See, e.g., O’Brien Decl., Ex. 18, U.S. Patent No. 4,775,219, col. 8:31-35.) Avery further asserts that without numerical precision, there will be no way to differentiate between “parallel”, “nominally parallel” and “substantially parallel.” 3M responds that the language cited by Avery as to “degree of precision” is an exemplary embodiment, not a definition.

The Court finds that Avery’s proposed construction is supported by the intrinsic evidence, and is favored over 3M’s proposed construction as to provides

guidance as to what is “nominally parallel” versus “non-parallel” as those terms are used in the asserted claims. The Court thus adopts Avery’s proposed construction of “nominally parallel.”

**g. “Primary Groove Face”**

3M proposes the following construction: “a face defined by the faces of multiple preferred geometry cube corner elements that lie in a common plane.” Avery’s proposed construction reads as follows: “a face defined by the faces of multiple cube corner elements that lie in the common plane.” As is clear from the parties’ proposed construction, the dispute concerns whether the term should be construed with regard to “preferred geometry” cube corner elements.

The term “primary groove face” appears in asserted claim 10 of the ‘426 patent, which depends on claim 5, which recites “[a]n article comprising preferred geometry cube corner elements.” Thus, for purposes of this action, the term “primary groove face” should be construed as referring to the “preferred geometry” cube corner elements.

**IT IS SO ORDERED.**

**Date: March 22, 2012**

**s/ Michael J. Davis**  
**Michael J. Davis**

**Chief Judge  
United States District Court**